Radiance Bias Determinations from Simulations

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AIRS Science Team Meeting

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Radiance Bias Determinations

Introduction

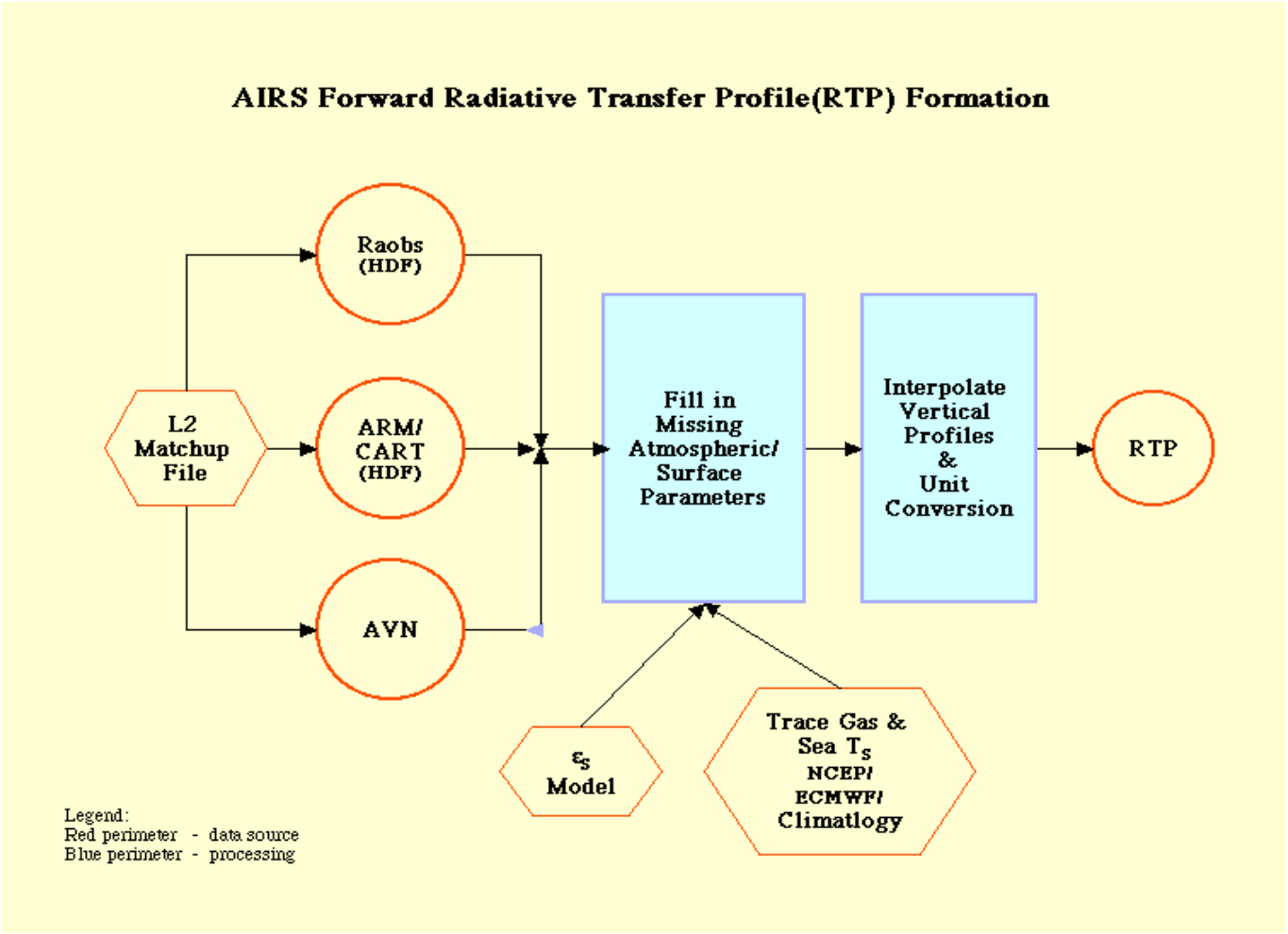
- Currently clear-sky radiance bias is computed for 12/15/2000 between L1B RTA simulated radiances (V2_2_3) and forward radiances calculated from correlative atmospheric state (PREPQC) using SARTA/RTP developed by UMBC
- Sources of bias only include uncertainty in the "truth" since the L1B simulated radiance and the forward calculated radiance are both clear and the RTA and SARTA algorithms are identical
- To be used as an analysis tool for observed radiance data
- To provide benchmark bias assessment for tuning AIRS observed radiance

Radiance Bias Determinations

Type of correlative data

- **PREPQC**
- **ARM/CART**
- **AVN forecast**

Radiance Bias Determinations



Radiance Bias Determinations

Correlative data used in the current analysis

- T and q profiles from PREPQC Raobs data, supplemented with AIRS L2 matchup retrieval or AVN forecast for the upper atmosphere
- O_3, CO, CH_4 profiles from UARS monthly-zonal mean climatology
- T_s from AVN forecast model, $\square_s$ and $\square_s$ from model
- Excluding sea ice
- Matchup criteria: mis_time 3 hrs, mis_distance 100 km

Radiance Bias Determinations

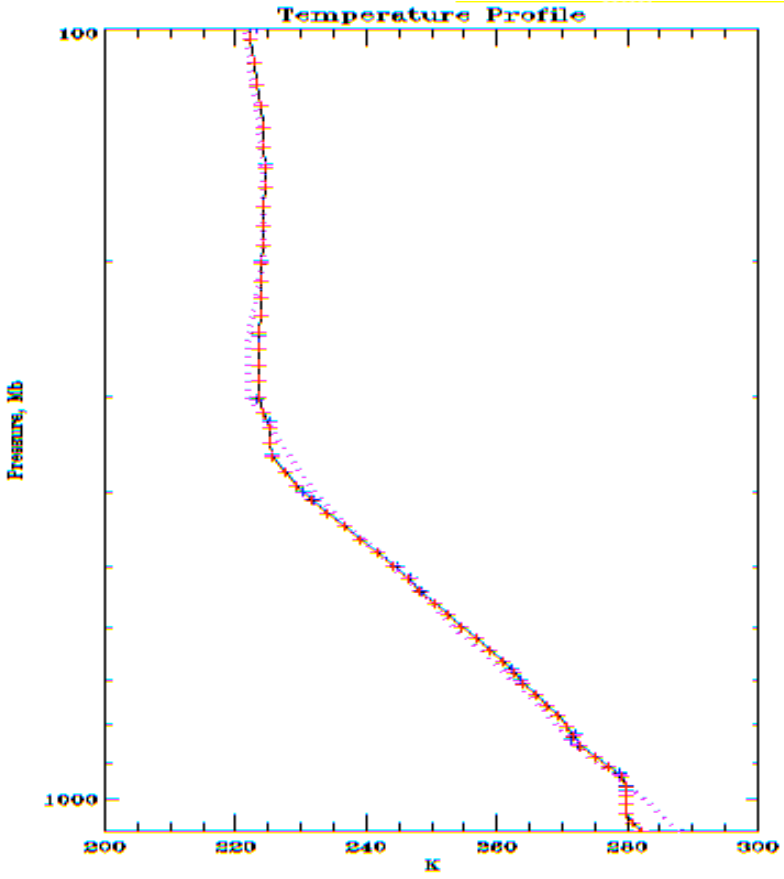
Radiance bias is calculated for the following cases

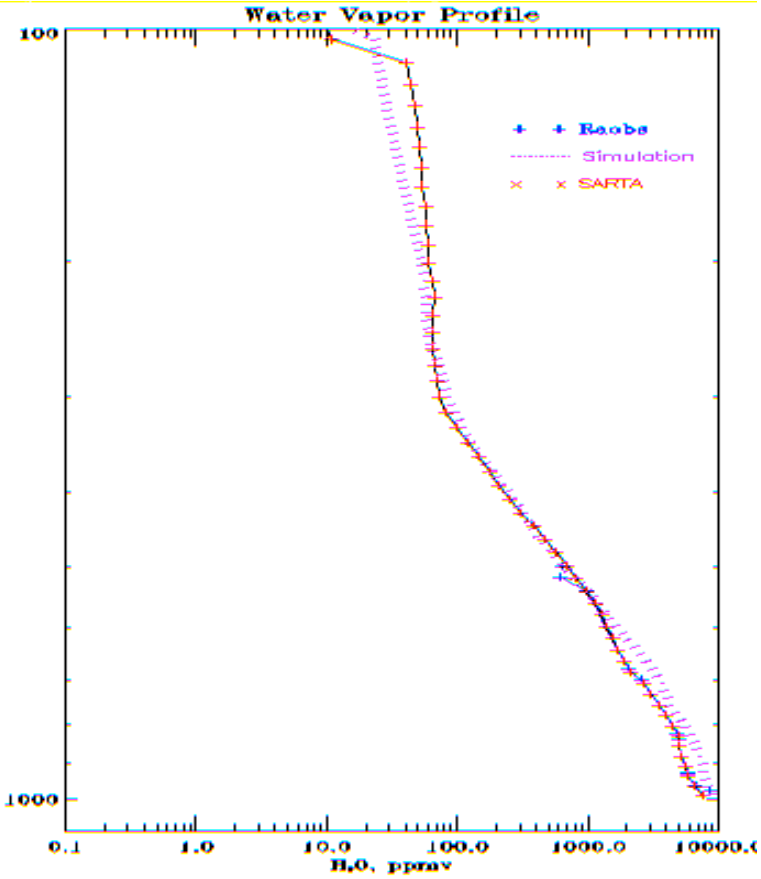
(Limited to -60^{o} to 60^{o} latitude)

- **Ocean/Night**
- **Ocean/Day**
- **Land/Night**
- **Land/Day**

Radiance Bias Determinations

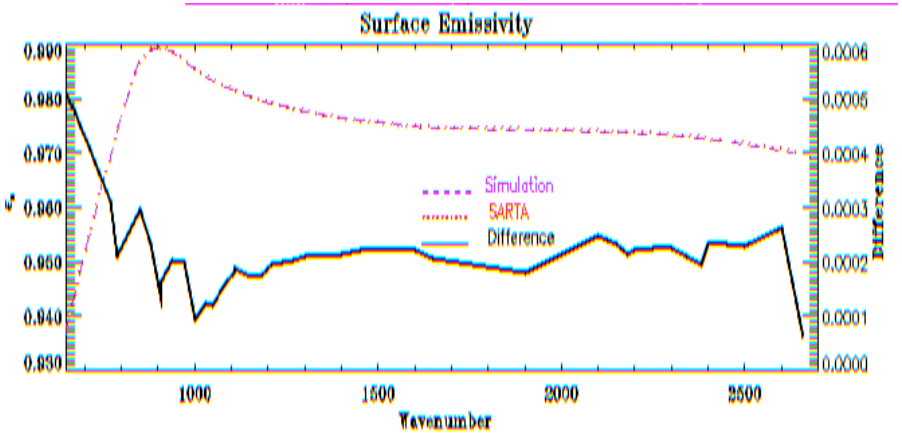
Ocean/Night: Temperature(left) and H_2O(right) Profiles

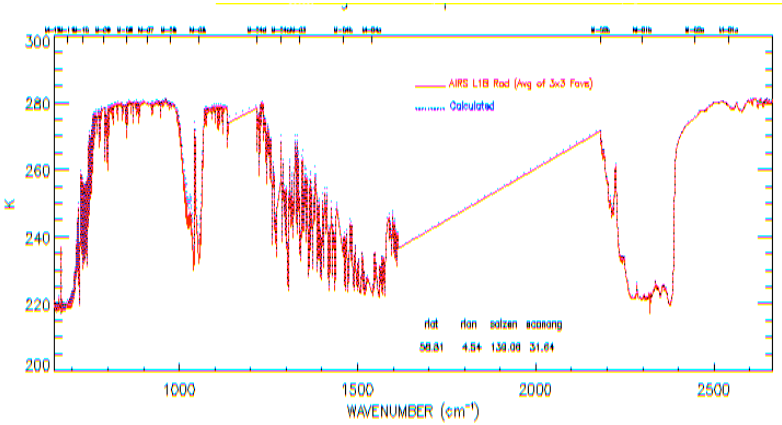


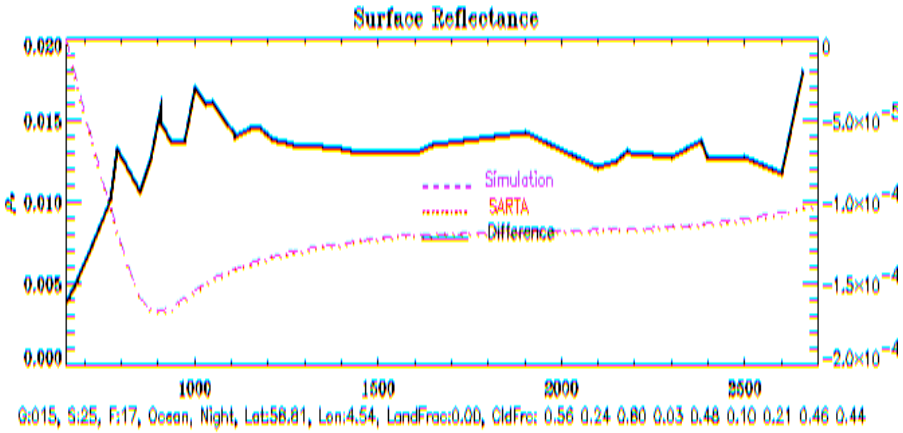


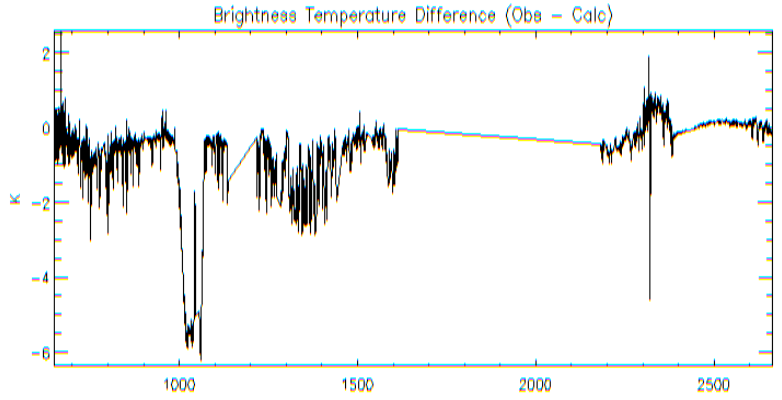
Radiance Bias Determinations

Ocean/Night: correlation between ε_s and ρ



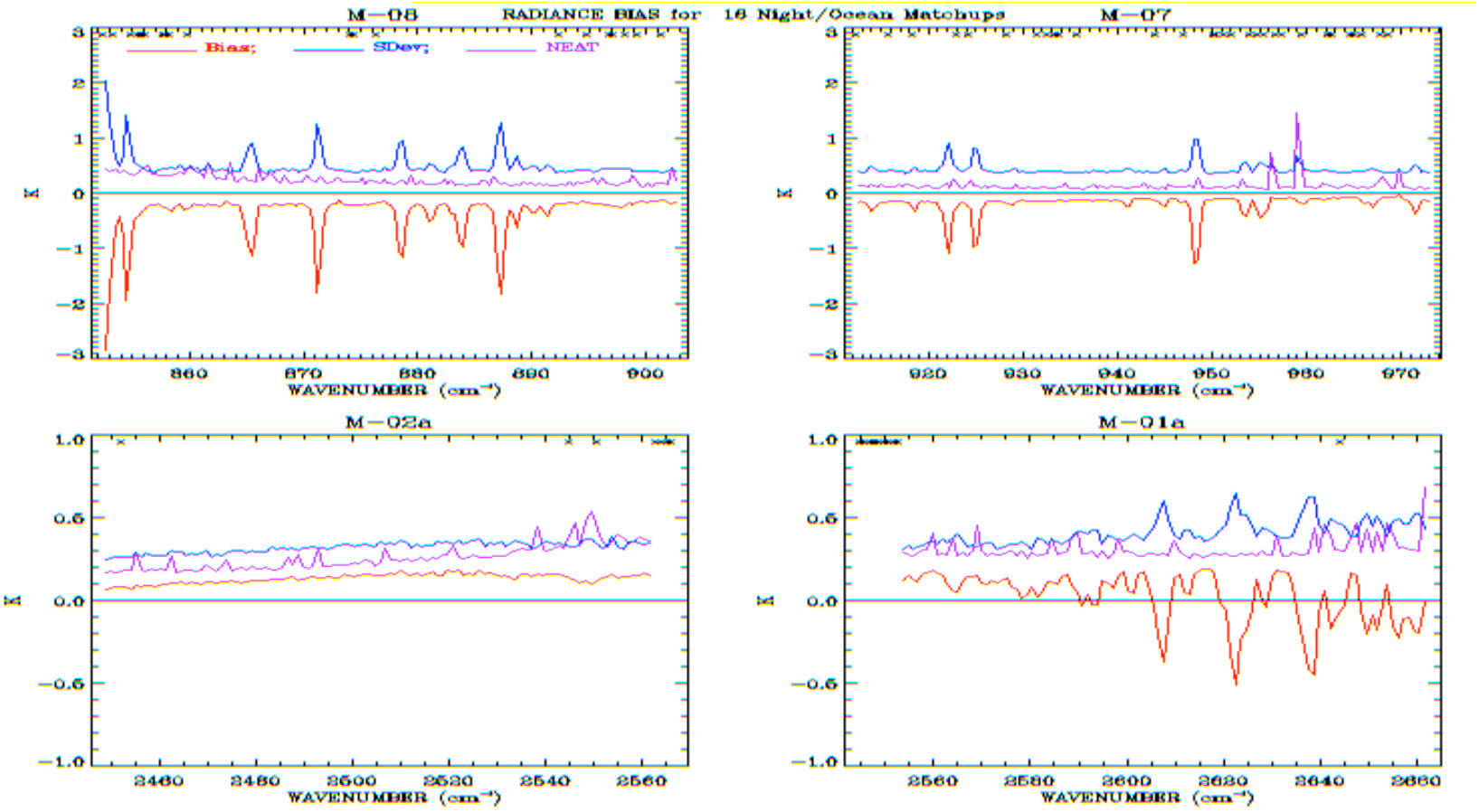






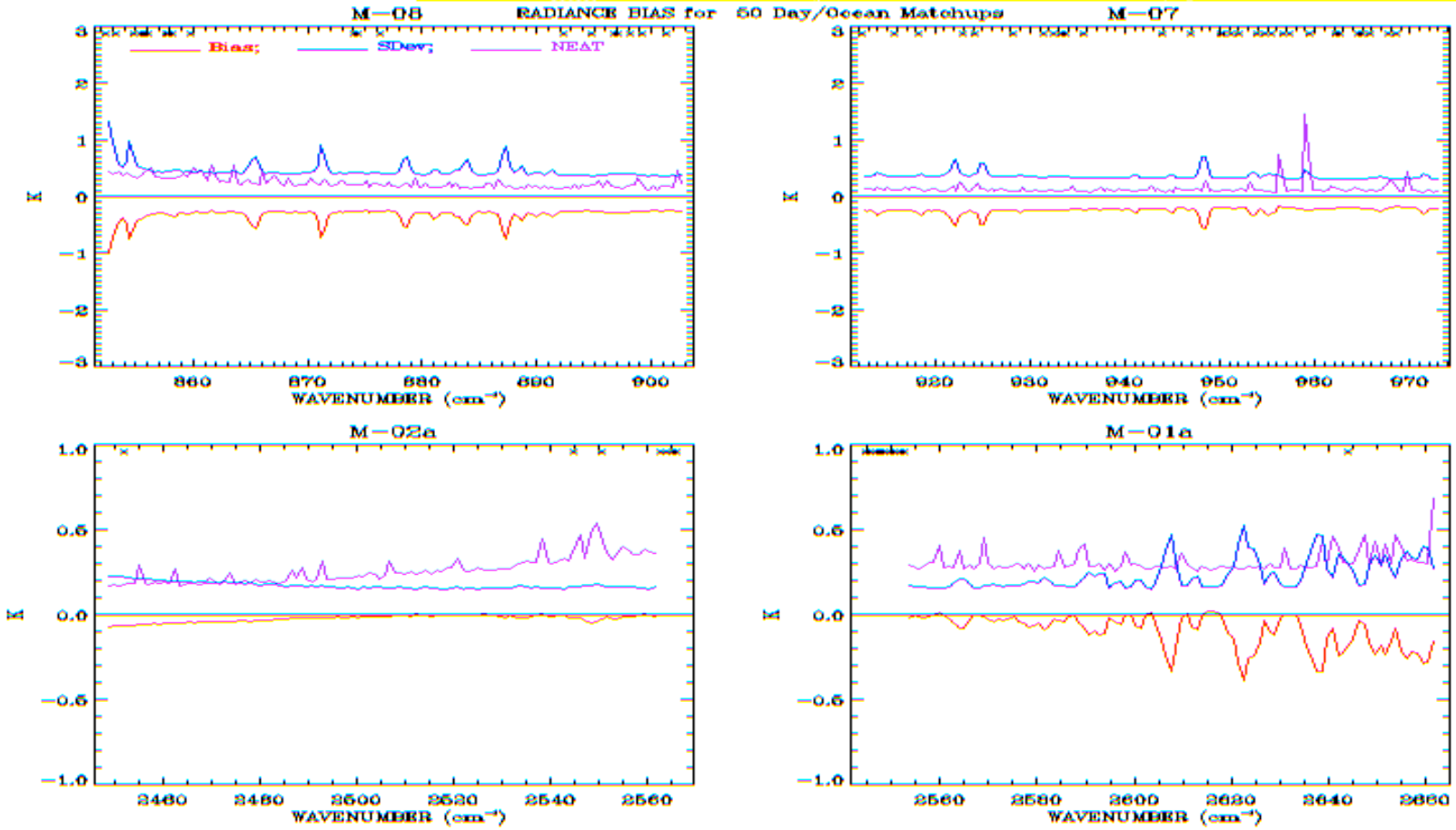
Radiance Bias Determinations

Ocean/Night: Bias/Sdev/NE□t for 16 matchups



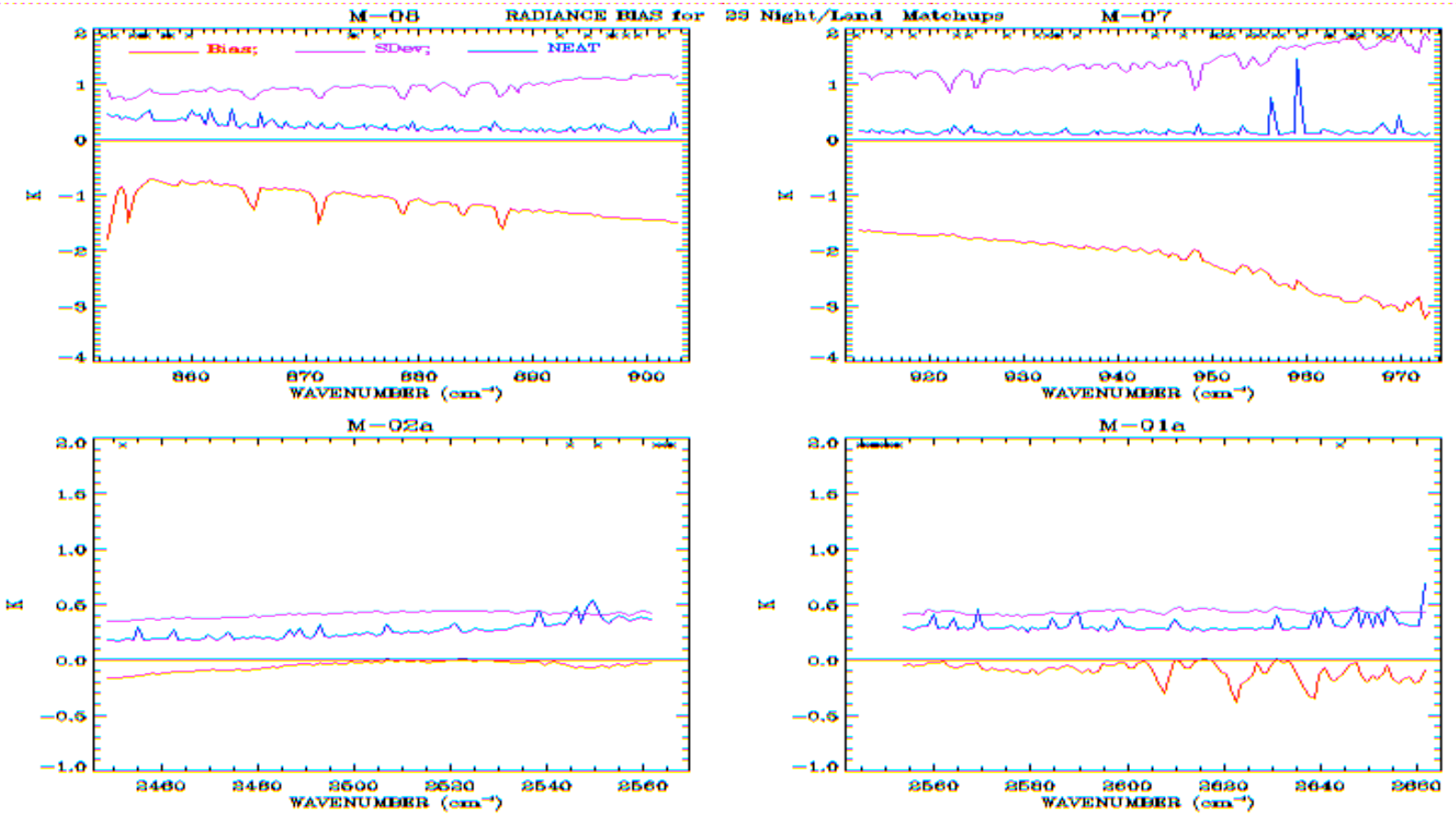
Radiance Bias Determinations

Ocean/Day : Bias/Sdev/Ne□t for 60 matchups



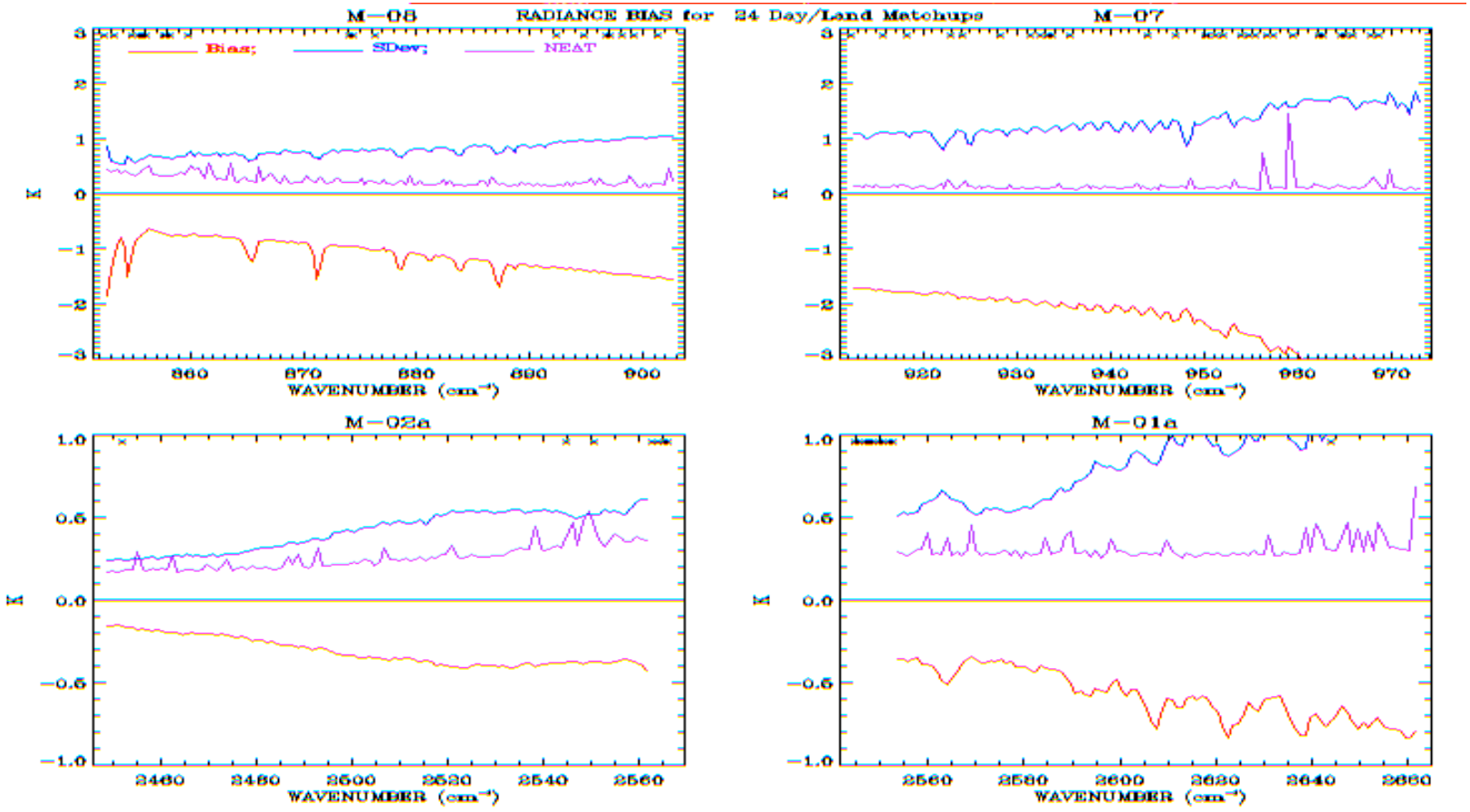
Radiance Bias Determinations

Land/Night: Bias/Sdev/Ne□t for 23 matchups



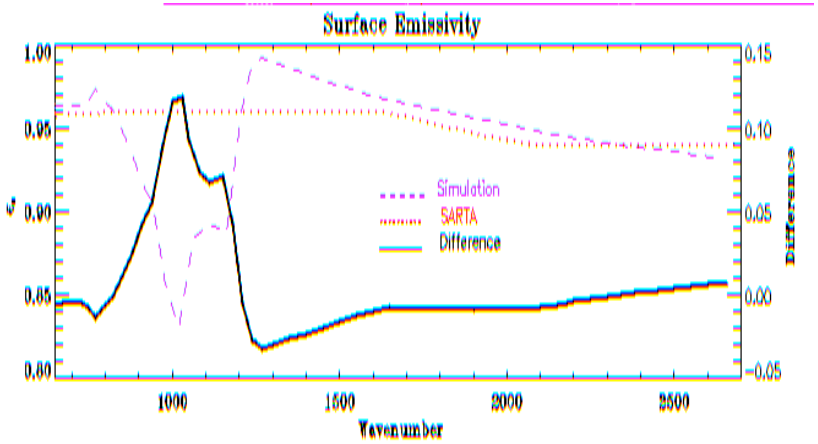
Radiance Bias Determinations

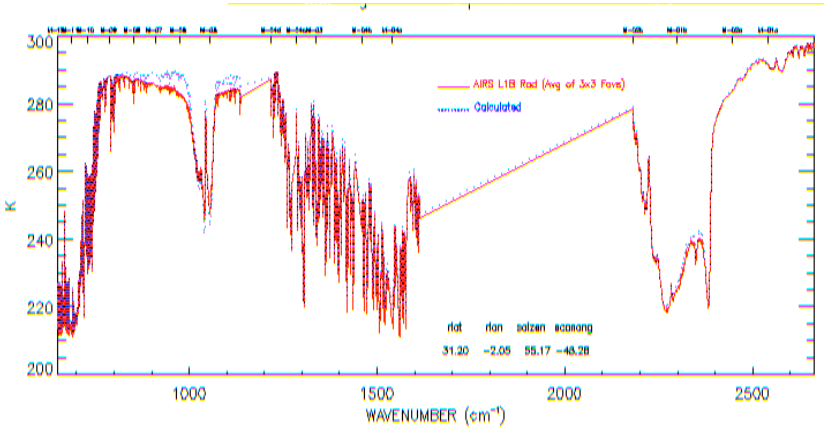
Land/Day : Bias/Sdev/Ne□t for 24 matchups

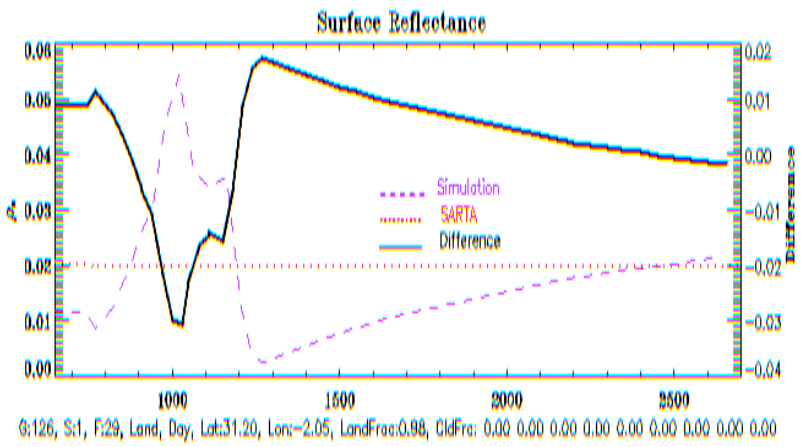


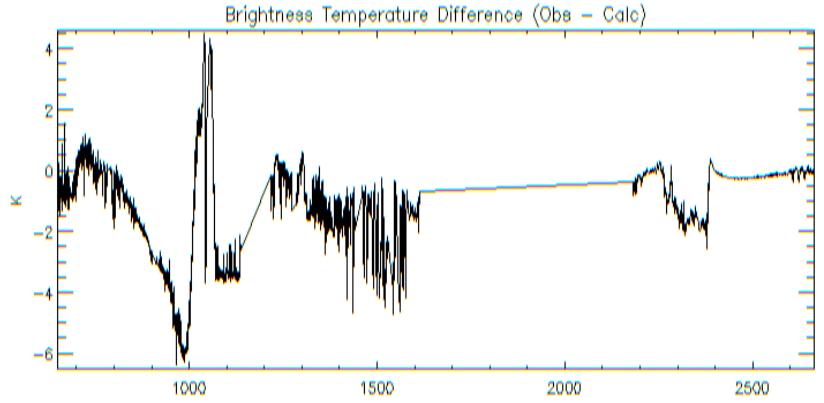
Radiance Bias Determinations

Land/Day: correlation between ε_s and ρ









Radiance Bias Determinations

Summary

- Over the ocean, the radiance bias due to uncertainty in atmospheric state is comparable to instrument noise in the window region away from H_2O or CH_4 absorption lines
- No major changes in bias statistics between day and night cases
- Over land, uncertainty in surface emissivity results in large bias (~ 5K) at the 10 □m window region
- High quality and accurate surface temperature, H_2O, O_3, CH_4 in-situ data are also indispensable in validating AIRS radiance products